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Exploring the Contemporary Challenges of Urbanization and the Role of Sustainable Urban Development: A Study of Lagos City, Nigeria

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ABSTRACT

As urbanization accelerates, sustainable approaches are necessary to counter the adverse environmental impacts. The study investigates the multifaceted challenges of Lagos City due to urbanization and evaluates the effectiveness of sustainable urban development in tackling these problems. It employed a mixed-methods approach to provide informed decisions for liveable urban environments. Census data, satellite imagery, interviews, surveys, and focus group discussions provided a comprehensive understanding of Lagos's urbanization and its effects. Findings reveal pressing problems such as housing shortages, infrastructure strain, traffic congestion, waste management difficulties, and socio-economic disparities in Lagos City. Local authorities and NGOs have implemented sustainable urban development initiatives, including transport upgrades, green space promotion, waste management, and housing solutions. Such case studies have revealed various interventions, such as informal settlement transformation, renewable energy integration, and urban regeneration. However, persistent issues still exist due to the city's urbanization. Therefore, Integrated urban planning, inclusivity in policy-making, and technological advances are essential for tackling these challenges. The findings contribute to the academic discourse by providing insights into Lagos City's urbanization and practical implications for sustainable urban development. It also highlights the need for comprehensive strategies to build a prosperous, equitable, and eco-friendly city.

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Highlights	Contribution to the field statement
- The study delves into the multifaceted challenges of rapid urbanization in Lagos City, Nigeria. - It underscores the role of sustainable development strategies in mitigating various environmental challenges. - The research provides valuable insights and recommendations that could be utilized in rapidly urbanizing cities facing similar challenges.	This study advances the discourse on 21st-century urbanization by examining contemporary challenges and emphasizing the crucial role of sustainable urban development in Lagos City, Nigeria. It highlights the intricate interplay of social, economic, and environmental factors in a dynamic African metropolis. The findings underscore the significance of sustainable urban development for creating resilient, equitable urban environments amid rapid urbanization.

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1. Introduction

Urbanization is an irreversible global trend reshaping cities into vibrant centers of economic, social, and cultural activity (Bibri, 2021). The rapid influx of people from rural to urban areas has triggered unprecedented urban expansion, presenting opportunities and challenges for urban planners, policymakers, and residents alike. Nigeria, ranked as the 32nd largest country worldwide in land area, encompasses approximately 923,768 square kilometres (Koko et al., 2020). In addition, the country is the 7th most populous nation, having a population of around 213 million (National Bureau of Statistics, 2019). Projections indicate that Nigeria's population will reach 239 million by 2025 and is expected to increase to over 440 million by 2050. This increase will make the country the 4th most populated globally (United Nations Department of Economic and Social Affairs, 2019). Urbanization, highlighted as a critical factor by Pickett et al. (2001), exerts significant pressure on the socio-economic development and environmental sustainability of developing countries such as Nigeria. Consequently, Temi and Champika (2018) have identified factors like politics, trade, industrialization, state creation, and infrastructure development as primary drivers of urbanization in Nigeria. These factors, in turn, have driven rural-to-urban migration, urban population growth, convergence of lifestyles, and economic expansion linked to urbanization.

The 21st century has witnessed urbanization's indelible imprint, with over half of the world's population now residing in urban areas, particularly in developing nations. Lagos, Nigeria's foremost urban center, is at the forefront of the nation's urbanization, with a historical legacy extending back to the 14th century. It is recognized as one of the world's fastest-growing cities (United Nations Department of Economic and Social Affairs, 2019). This growth trajectory is emphasized by the projection that Lagos City's population will grow at a rate of 77 people per hour between 2010 and 2030, cementing its position as Africa's fastest-growing city (Hoornweg & Pope, 2016).

Recently, Lagos has experienced rapid urbanization and a complex web of interconnected challenges. As the population grows, concerns intensify over inadequate infrastructure, environmental degradation, social inequality, and resource scarcity. The United Nations Department of Economic and Social Affairs (2019) characterizes Lagos City as a renowned urban hub with a remarkable transformation in the last two decades. From being a city marked by alarming development trends in the late 1990s, Lagos has evolved into a vibrant hub of economic and industrial activities (Aliyu & Amadu, 2017). This transformation is attributed to several researchers, including Olajide et al. (2018), who have highlighted Lagos's role in driving over 65% of Nigeria's commercial and industrial activities (Auwalu et al., 2021). This positions Lagos as an economic powerhouse within Nigeria and the broader West African region (Akiwumi & Onyekwena, 2022). Presently, Lagos is one of the most urbanized cities in Africa (Merem et al., 2018). The city boasts a population density of 7,530 individuals per sq. km and urban dwellers of 14.6 million in 2018, spanning an area of 1,943 sq. km.

The high urban population of Lagos, propelled by the city's rapid urbanization, has given rise to various challenges, including housing shortages, the proliferation of slums, transportation and mobility issues, urban poverty, and environmental concerns (Adedeji, 2023; Badmos et al., 2018; Olajide et al., 2018). Consequently, sustainable urban development emerges as a comprehensive strategy to address these multifaceted challenges, aiming to foster cities that are resilient environmentally, inclusive socially, and vibrant economically. Therefore, the present study aims to comprehensively examine the contemporary challenges posed by urbanization in Lagos City, Nigeria, and critically assess the role of sustainable urban development strategies in addressing these challenges. By scrutinizing the challenges confronting Lagos City and evaluating the efficacy of sustainable development initiatives, this paper contributes to the ongoing discourse on urban planning and policy formulation in the context of global urbanization trends. To achieve this, the study's objectives include:

1. Examine the factors responsible for Lagos City's urbanization and rapid population growth.
2. Identify and analyze the key challenges that have arisen due to the rapid urbanization in Lagos City.
3. Evaluate the sustainable urban development initiatives local authorities and organizations undertake to address these challenges.

4. Provide valuable insights and recommendations for policymakers, urban planners, and stakeholders regarding the effectiveness of sustainable urban development strategies in Lagos City and beyond.

2. Study Area and Data

2.1 Study Area

Lagos lies between Latitude 6°15′N and 6°41′N and Longitude 2°42′E and 4°14′E on the West Coast of Africa and is located on the Atlantic coast in South-Western Nigeria as shown in Figure 1~~Figure 1~~. It is Nigeria's smallest state, covering approximately 3,577 square kilometres (sq. km), or 0.4% of the country's total landmass (Auwalu et al., 2021). Lagos is divided into 20 Local Government Areas (LGAs), with 16 designated as high-density metropolitan areas (Ndidi & Nduka, 2014). Also known as Greater Lagos or the Lagos Metropolitan Area, Lagos is located on a vast lowland and island, with approximately 220.6 square kilometres of the city comprising water bodies, mangrove swamps, and wetlands, making it a busy port city. Lagos, together with its neighbouring metropolis, is Nigeria's largest city and the country's most important economic centre, having the country's major seaports. According to Gbenga (2023), Lagos accounts for 10% of Nigeria's Gross Domestic Product (GDP) and over 90% of Nigeria's trade flow. The city is the fifth largest economy in Africa, having 65% of Nigeria's manufacturing sector. Lagos has a dense and vast network of urban settlements and towns interconnected by various road networks (Lawanson & Agunbiade, 2018). With an astronomically growing population, Lagos City is characterized by unplanned and chaotic urbanization and infrastructures considered inadequate and deteriorating (Wang & Lu, 2018).

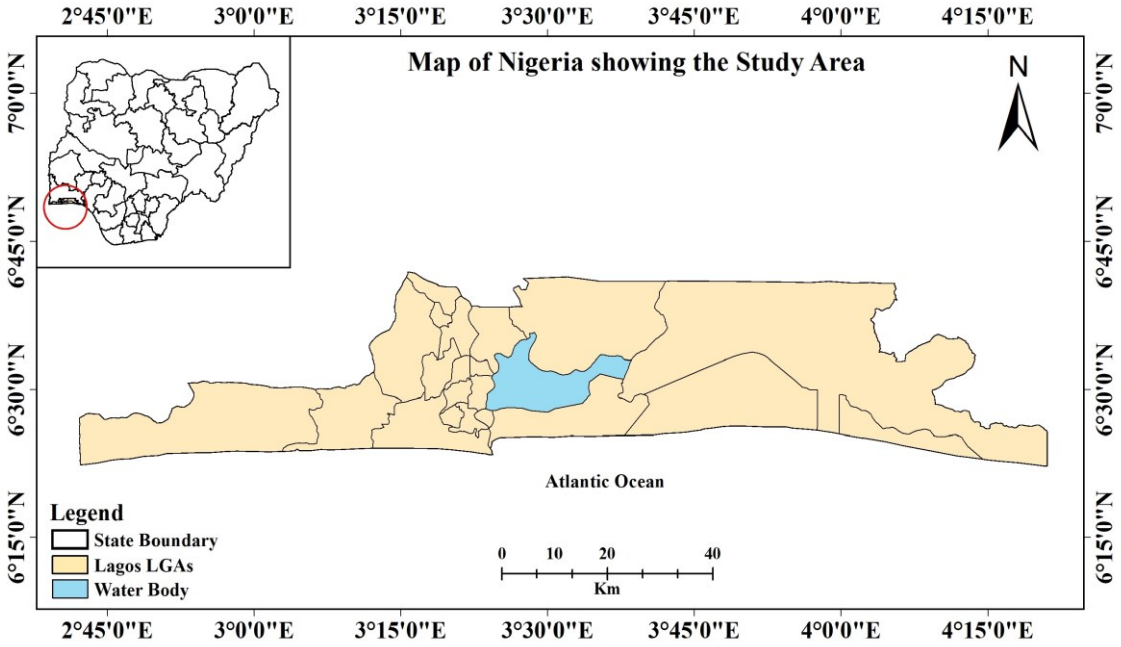

Figure 1. Location Map of the Study Area, i.e., Lagos, Nigeria.

2.2 Demographical Data

Despite several controversies trailing the population figures of Lagos, there is a collective consensus that the population of Lagos has increased tremendously during the last decades (Asuquo Enoh et al., 2023; Gandy, 2006; Kookana et al., 2020; O'Connor, 1998). According to Nigeria's population census reports, the city's population is estimated to be approximately 22 million. This makes Lagos a mega-city, with a substantial proportion of the city's population living in urban areas. Data from UN-Habitat and other international development agencies indicates Lagos has an urban population of approximately 14 million as of 2018, as shown in Figure 2~~Figure 2~~(A). This high urban population is mainly due to industrialization, leading to Lagos's designation as an urbanized city.

The population of Lagos is growing ten times faster than that of New York and Los Angeles, which is also more than the population of 32 African countries put together, with the city's population likely to be over 35 million populace by 2050. According to Güneralp et al. (2017), Lagos is the third-largest mega city in Africa, after Cairo and Kinshasa, having an urban population of over 10 million populace. However, the city's population growth rate shows a decreasing trend from 1990 to date, as shown in Figure 2~~Figure 2~~(B), which indicates a reduction from 6.36% in 1980 and 1990 to about 3.24% in 2019. This decreasing population growth rate highlights that it is not the only reason for urbanization but also migration as a significant contributing factor to the growth. Most of the people who migrated to Lagos settled in urban areas, thereby exerting much pressure on existing urban infrastructures. This increased influx of people to the city of Lagos has contributed to the increasing number of squatter settlements and slums in the city.

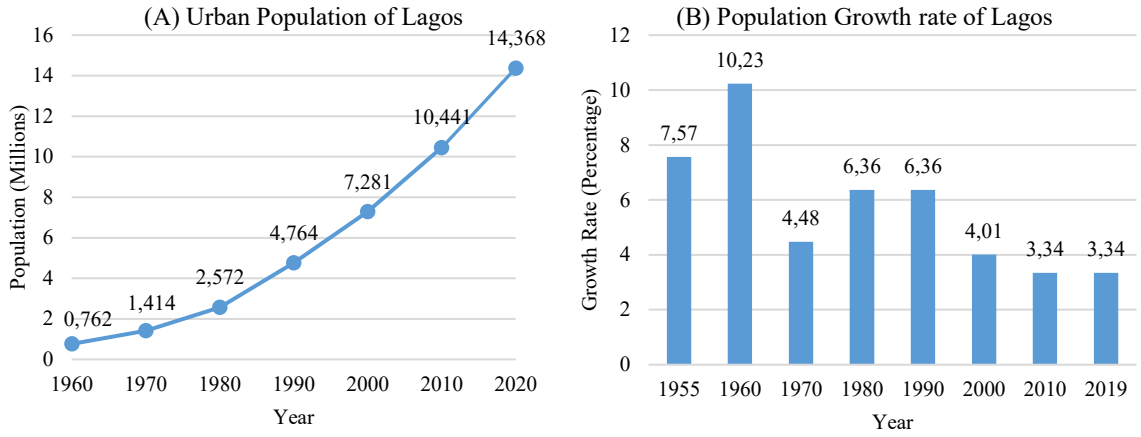

Figure 2. (A) Urban Population and (B) Population Growth Rate of Lagos from 1950 to 2020.

2.3 Classified Land Cover Data (CLCD)

We acquired the classified land cover of the study area from the previously published decadal classified land cover data of Lagos. These data, retrieved from the studies of Auwalu et al. (2021), covered the period from 1990 to 2020 and consisted of four land cover classes. The spatial resolution of the land cover data was 30 m. The classification accuracy was assessed by sample validation, and results presented an overall accuracy above 85% and a Kappa index above 0.7. The result indicates unbiased data that could be utilized in further analysis of urbanization.

3. Methodology

The research adopted a comprehensive and mixed-methods approach to analyze the challenges posed by urbanization in Lagos City and assess the effectiveness of sustainable urban development initiatives. The methodological approach integrates quantitative and qualitative techniques to understand complex urban dynamics better.

3.1 Research Design

The research design comprises the quantitative and qualitative phases.

- In the quantitative phase, census data and satellite imagery were utilized to assess the extent and patterns of urban growth in Lagos City. Population data spanning several decades were used to analyze the rate of urbanization and its demographic implications. GIS tools were employed to assess urban expansion and examine its challenges.
- The qualitative phase involves interviews and focus group discussions conducted with key stakeholders. These stakeholders include urban planners, policymakers, community leaders, and residents. The interviews helped us understand their perspectives on urbanization challenges, sustainable development initiatives, and their perceived impacts on the city, while the Focus group discussions facilitated open dialogue on critical issues.

3.2 Data Collection

Census data from multiple years were obtained from the relevant governmental agencies and supplemented with information from international databases. Remote sensing techniques were used to assess changes in land use and land cover over time, which helped to understand urban expansion trends. Also, a semi-structured interview was conducted with urban planners, policymakers, and NGO representatives to gain insights into policy formulation, implementation challenges, and future directions. Focus group discussions with community members will provide a grassroots perspective on the effects of urbanization and sustainable development initiatives on their daily lives.

3.3 Data Analysis

For the data analysis, we subjected the data from the interviews and focus group discussions to thematic analysis. Common themes and patterns related to urbanization challenges and sustainable development strategies were identified to provide a holistic understanding of the research questions and inform policies and practices for creating sustainable urban futures.

4. Results and Discussion

4.1 Factors Responsible for Urbanization and Population Growth in Lagos, Nigeria

Several factors have been identified to be responsible for urbanization globally. These factors include economic and industrial growth, infrastructural development, population increase, and rural-urban migration (Cohen, 2006; O'Neill et al., 2012; Thomas, 2008). Thomas (2008) asserts that about 60 percent of the global population growth can be attributed to natural increase and maintains that such a population still continuously increases. Similarly, Turok and McGranahan (2013) believe that global population growth contributes significantly to urban development and urbanization. In Nigeria's context, urbanization is primarily a result of economic growth due to industrialization and the migration of people from rural areas to urban centers. The main factor responsible for urban development in Nigeria is rural push combined with urban pull. These 'Push factors' are accountable for the migration of people to urban centers such as Lagos city. Some of these rural push factors include but are not limited to poor living conditions, poverty, political neglect, environmental degradation, poor healthcare, inadequate educational facilities, and lack of essential infrastructural services. Due to this, other urban 'pull factors' attract the rural population to urban centers such as Lagos in Nigeria. These pull factors include better employment opportunities, living conditions, infrastructures, and educational and healthcare services. According to Olajide et al. (2018), the city's physical configuration and socio-economic structure have contributed significantly to the urban growth and expansion of Lagos, leading to urbanization. Rural-urban migration has also increased as a result of better employment opportunities in Lagos, which signifies the influence urban centers have on the rural hinterland and also conforms with the assertion of Ventriglio and Torales (2021), which identified urbanization to be a process that leads to the growth of urban centers due to economic development and industrialization. As such, some factors primarily responsible for urbanization and population growth in Lagos can be attributed to employment opportunities, industrialization, modernization, and other social factors. These factors have contributed to the city's rapid urban expansion, as shown in Figure 3~~Figure 3~~.

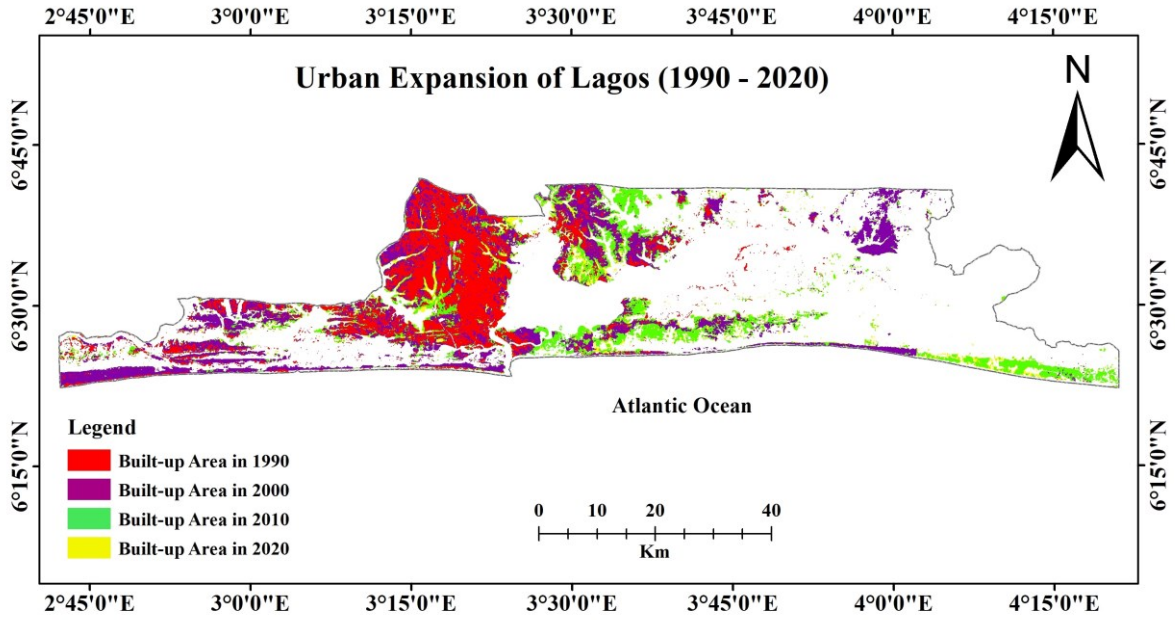

Figure 3. Lagos City's Urban Growth Map.

4.2 Challenges of Urbanization and Population Growth in Lagos, Nigeria

The rapid urbanization and population growth in Lagos has been tremendous and has led to undesirable consequences for the city as evidently in the increased number of slums and informal settlements, the inadequate number of affordable housing, the city's urban mobility and transportation problem, the city's solid waste management problem, environmental pollution, and declining job opportunities, poverty, and other social problems.

4.2.1 Housing, slums, and informal settlements

The increase in the number of slums and informal settlements in Lagos is one of the main challenges of urbanization and population growth in the city. Housing, also referred to as human settlement, is generally considered one of the basic needs of life and an essential priority for survival (Ademola, 1990; Adepoju, 1995; Fang et al., 2022). Perrucci et al. (2016) describe housing as the provision of well-designed shelters in a neighbourhood sustained by a built environment for the daily activities of residents residing in such communities. On the other hand, the United Nations slum indicators described slums as contiguous settlements with inadequate housing and other necessary infrastructures and services (UN-HABITAT, 2002). Public authorities usually do not recognize them as integral to the city. The depiction of slums and informal settlements in Lagos is evident in the low-income houses with poor living conditions in some areas of the city, in addition to the traditional slums of Lagos, which have old houses and settlements that have deteriorated over time due to neglect. Such categories of houses are typically partitioned and rented out to less privileged families. Slums and informal settlements in Lagos often evolve due to the government's inability to provide adequate and affordable housing for the city's growing urban population. They usually serve as settlements for most rural populace migrating to Lagos. These settlements have evolved indiscriminately in vulnerable areas prone to erosion, flooding, rising dampness, fire outbreaks, building collapse, and other environmental and social epidemics. Therefore, Slums and informal settlements in Lagos are manifestations of a growing population without a corresponding increase in the provision of adequate and affordable housing. According to Ibem (2011) and Olugbenga and Adekemi (2013), the current housing shortage in Lagos is anticipated to be over 5 million housing units, accounting for approximately 31% of Nigeria's estimated national housing deficit. This high shortfall contributes significantly to the subsequent increase in the development of slums and informal settlements in Lagos. Similarly, the urbanization process of Lagos, coupled with the city's inadequate urban planning policies, strategies,

and initiatives, has continuously contributed to inadequate housing and other necessary infrastructural services. This promotes the growth of slums and other informal settlements. Over the years, the slums in Lagos have increased from 42 slum districts to over 200, ranging in size from shacks clusters beneath highways to entire neighborhoods (Ifeoma et al., 2023). An example of such a slum settlement is the Makoko floating settlement shown in Figure 4~~Figure 4~~.

Figure 4. Makoko floating slum settlement in Lagos, Nigeria.

A critical factor in overcoming the challenge of inadequate housing, slums, and informal settlements in Lagos is modifying the city's urban planning and development approach by retrofitting slums and informal settlements with sustainable, contemporary, and smart housing types. This can be achieved through strategies such as slum upgrades through site and services schemes, Public-Private Partnership (PPP) estate developments, homeownership through mortgage systems, development of neighborhood urban renewal policies, and the promotion of multi-story mixed-used and residential developments.

4.2.2 Urban Mobility and Transportation Problem

One of the challenges faced by most fast-growing cities in Africa due to urbanization is providing infrastructure and managing the increasing transport demand. Urban Mobility and transportation problems in most African cities are mainly due to inadequate transport infrastructure that will meet the growing cities' demand. The condition is not different from the system in Lagos, where the transport infrastructures have been neglected for many years, coupled with the increasing urban population, resulting in an unsustainable and chaotic transport system due to traffic congestion, as shown in Figure 5~~Figure 5~~ (A) and (B). The predominant transport system in Lagos is road-based, with approximately 90% of the city's inhabitants utilizing the roads as a means of transportation. Lagos has more than one million vehicles plying the city's roads daily, with a public transport density of 3 buses per 1000 people and a high car density of 222 vehicles per roadway kilometre as compared with Nigeria's national average of 11 vehicles per kilometre (Ibitayo, 2012). Lagos also has about 7,598 km of roads with a high road density of 2,972 persons per kilometer, as against Seoul and Tokyo, which have a road density of 1,358 and 544 persons per kilometer, respectively. Therefore, the road networks in Lagos are grossly inadequate to meet the city's travel demand. As a result, Lagos is usually congested compared to other cities due to these transport sector conditions and the state of road infrastructures in the city. The challenge of urban mobility and transportation in Lagos ranges from social and human problems, inadequate infrastructures, non-standardization, and upgrade of the transportation system, as well as institutional issues like poor management and implementation of policies and projects.

Figure 5. (A) Traffic congestion on Lagos city's highway and (B) Mini-buses (Danfos) parked on roads.

Other contributing factors to the problem of urban mobility and transportation in Lagos include the insufficient number of primary corridors and interchanges and the insufficient bus stations to accommodate the city's traffic. This has led to the poor outlook of the public transport system in Lagos and has subsequently affected the city's living and working alongside the economic development of Lagos. It has also contributed to the reduction in the city's quality of life due to environmental pollution caused by traffic congestion, mainly due to the high utilization of private vehicles and reliance on informal transportation modes like mini-buses, popularly called Danfos and shared taxis. Therefore, the solutions to the challenge of urban mobility and transportation in Lagos due to urbanization and population growth include but are not limited to the re-development and revitalization of the city's urban center through people-oriented urban renewal strategies. Such strategies involve having pedestrian-friendly facilities that encourage non-motorized transportation and developing and integrating various transportation systems such as Mass Rapid Transit Systems (MRTSs) and Light Rail Transits (LRTs) to cover the whole of Lagos City. Also, the land use policy of Lagos needs to be revised to introduce policies that would assist in decongesting the city center through activity decentralization. This will subsequently reduce the pressure on existing transport networks due to the movement of people to the city center.

4.2.3 Solid Waste Management Problem

The management of solid waste in urban centers, which includes various aspects such as storage, collection, transportation, treatment, and disposal, is one of the challenges faced by most growing cities due to urbanization and rapid population growth. This scenario is similar to Lagos in Nigeria, with most people adjudging the city's poor waste management practice to the unprecedented growth of Lagos. The problem of solid waste management in Lagos began in the early 1970s due to the oil boom in Nigeria, which led to urbanization and rapid population growth in the city. This resulted in a high volume of daily waste, which became overwhelming for Lagos city administrators to effectively manage, as presented in Figure 6~~Figure 6~~. As a result, Lagos became one of the world's dirtiest cities in 1977. However, hosting the second World Black and African Festival of Arts and Culture in 1977, known as FESTAC '77 in Lagos, catalyzed the establishment of the Lagos State Refuse Disposal Board (LSRDB) to address the problem of solid waste management in the city. Powell Duffen Canadian Pollution Control Consultants supervised the LSRDB. Later, in 1981, it was renamed to Lagos State Waste Disposal Board (LSWDB) to reflect its additional responsibilities, including handling commercial and industrial waste, drainage clearance, and collection and disposal of scrapped and derelict vehicles within Lagos.

Figure 6. Refuse dumps along Motor Parks and Roadsides in Lagos, Nigeria.

In 1991, the LSWDB was transformed into a Lagos State Waste Management Authority (LAWMA) agency. This agency was responsible for ensuring efficient collection and disposal of residential and industrial waste, providing waste management services to commercial institutions, and managing government-owned dumpsites in Lagos. LAWMA operates four dumpsites in Lagos, covering a total of 63.67 hectares, and are strategically located within the Quaternary lateritic clay deposit of the city, with each dumpsite receiving an average waste of about 3,250m³ per day of the city's 13,000 metric tons of waste generated daily, however, despite creating and transforming these boards and agencies to improve and combat the threat posed by solid waste management practices in Lagos. These efforts are still unsuccessful due to the high rate of environmental pollution in Lagos, which is caused by poor solid waste management practices. Therefore, more efforts are needed by various stakeholders in addressing the problem of solid waste management in a multifaceted and dynamic urban center such as Lagos, which has rapid population growth. Hence, this can be managed from the point of resident's waste generation by providing adequate waste disposal points and dumpsites by relevant authorities and improving the city's evacuation and management system through initiatives such as waste-to-wealth. All these are geared towards having a city with a sustainable waste management system.

4.2.4 Environmental pollution

Environment pollution due to urbanization and rapid population growth is also a problem facing Lagos as an urban center in Nigeria. This is of great concern to the city due to its health implications. The environmental pollution in Lagos predominately occurs due to the emission of greenhouse gases (GHGs) and their wastes into the environment, as shown in Figure 7~~Figure 7~~. These greenhouse gases, such as carbon monoxide, are primarily produced through industrial activities or vehicular exhaust emissions from transportation. The continuous emission of such greenhouse gases in Lagos has significantly contributed to global warming, a critical issue affecting every nation. Several researchers believe that environmental pollution in Lagos is primarily caused as a result of the unprecedented growth of the city due to urbanization. The growth in the city's population due to rural-urban migration has decreased the city's air quality and various environmental consequences (Adedibu & Okekunle, 1989). Similarly, other studies highlighted this problem's implications to include several health challenges. Okebukola (2001) observed that a prominent contributing factor to the spread of parasitic and gastro-internal diseases in Lagos includes the haphazard handling and disposal of gaseous chemical waste. Likewise, a study conducted by Alo et al. (2014) suggests that a significant amount of pollutants are discharged into Lagos Lagoons. This results in the daily contamination of the city's water, shortage in the potable water supply, other waterborne diseases, and threats to aquatic life. The increasing cost of treating this contaminated water for domestic and industrial use in Lagos has been detrimental to the city's urban productivity.

Figure 7. Air Pollution of Lagos, Nigeria.

Adekunle et al. (2021) further identified other sources of environmental pollution in Lagos, comprising noise pollution from moving vehicles, religious centers with high-volume amplifiers, households, and industrial power generators. This has led to various impairments like difficulties in hearing and other ailments, particularly for residents living or working around such areas. Therefore, environmental pollution due to urbanization and rapid population growth in Lagos poses a significant threat to the health and well-being of the city's residents due to the various adverse effects of air, water, and noise pollution. This problem can be solved through deliberate policies and strategies to prevent and control multiple sources of pollution. It can be attained by developing initiatives and laws to achieve an environmentally friendly and sustainable urban atmosphere. Also, upgrading the city's energy use and providing alternative transport methods that enable traffic calming will significantly help reduce the amount of GHG emissions to the environment due to exhaust emissions from vehicles. These solutions are not only beneficial to Lagos city's environment but will also improve the health and well-being of the city's inhabitants.

4.2.5 Unemployment and Urban Poverty

In most developing countries, such as Nigeria, there is an increased shortage of jobs in urban centers due to the migration of people to urban areas without a corresponding increase in new job opportunities by both the public and private institutions. Data from Nigeria's Bureau of Statistics (NBS) reveals that Nigeria's unemployment rate increased from 18.8 percent in the third quarter of 2017 to about 23.1 percent in the third quarter of 2018. Lagos has continued to witness an increasing unemployment rate since the aftermath of the 1980s oil crises, which led to the systematic deviation of the country's currency, partial removal of subsidies on fuel, and the increment in taxes and tariffs. This forced many industries to shut down or cut down jobs due to the economic downturn and resulted in the inadequacy of job opportunities required to actively engage the large percentage of the teeming urban job seekers, leading to urban poverty. Hence, making much of the urban population, especially the youths, unemployed with no jobs to meet their daily needs, resulting in challenges such as increased criminal activities, theft, robbery, kidnappings, and many others. As a result of the increasing rate of unemployment in Lagos, most urban populace work in informal sectors such as home-based and small-scale businesses, providing the necessary and additional means of social protection. The continual growth of this informal sector in Lagos is mainly due to the city's decline in formal sector job opportunities. This has also resulted in a large urban populace engaging in multiple livelihood strategies, utilizing the informal sector by both employees of public and private organizations to sustain livelihood. Therefore, developing rural areas by creating agricultural-based industries that will provide job opportunities for the rural populace is vital in reducing the pressure on urban jobs caused by rapid population growth due to rural-urban migration in Lagos. Also, the government should provide private investors with grants, subsidies, and tax holidays to encourage the creation of job opportunities for both skilled and unskilled urban residents. This will promote utilizing labor-based technologies, creating more employment opportunities that will subsequently increase self-dignity, self-reliance, and standard of living.

5. Conclusions

This study examined the nature and challenges of urbanization and population growth in Lagos, Nigeria, as well as the factors responsible for these challenges. As a case study, the study explored the global and regional concepts of urbanization, focusing on Lagos in Nigeria. The motivation of this study is the prediction of the United Nations, which forecasts a rapid population growth in Nigeria's urban centers, particularly Lagos, which, if not properly managed, will lead to the deterioration of living conditions in such urban centers. Therefore, this study analyzed Lagos, the largest urban center in Nigeria and the fastest-growing city in Africa. The study conforms to various literature, archival sources and subsequently identified the multiple challenges of urbanization and rapid population in Lagos to include the proliferation of slums and informal settlements, inadequacy of affordable housing, urban mobility and transportation problems, solid waste management problems, unemployment and declining job opportunities; poverty; environmental pollution and other social problems. The study identified Lagos City's challenges in Nigeria due to various urban pull factors contributing to the city's continuous population growth. Lagos, the most urbanized city in Nigeria, has a highly complex system with solutions to the city's challenges requiring an integrated approach. The study, therefore, advocates better environmental and waste management practices in managing the environmental challenges in Lagos. It also suggests the development of initiatives, policies, and laws that encourage public-private partnerships through grants, subsidies, and waivers to create more employment opportunities and boost economic prospects while managing the city's ever-increasing population. This will help improve the city's living conditions and create a conducive environment. The study concluded that the various challenges due to urbanization and rapid population growth in Lagos could be reduced to the barest minimum through different urban renewal strategies and developmental approaches that are sustainable, environmentally friendly, and people-oriented.

Limitations and Areas for Future Studies

While this study offers valuable insights through its comprehensive analysis, certain limitations require attention. The research's scope, although extensive, may not fully capture all possible dimensions of the challenges posed by urbanization in Lagos. Additionally, the study relies on historical and archival data, which may not adequately reflect the complexities of current urbanization trends. To address these limitations and further contribute to the discourse, future research could:

i. Undertake in-depth qualitative studies to gain insights into Lagos residents' experiences, perceptions, and aspirations amidst urbanization.
ii. Employ advanced modelling techniques to project and analyze future urban growth scenarios and their associated challenges.
iii. Delve into comparative analyses with other rapidly urbanizing cities to glean insights into practical strategies for managing urban challenges.
iv. Examine the role of technology and innovation in enhancing sustainable urban development and addressing urbanization challenges in Lagos.

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Conflict of Interests

The Author(s) declares(s) that there is no conflict of interest.

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Data availability statement

All the relevant data from this study are available from the corresponding author upon request.

CRedit author statement

Conceptualization: A.F.K., and M.B. Methodology: A.F.K., and M.B. Software: A.F.K.Validation: M.B. Formal analysis: A.F.K. Writing-original draft preparation: A.F.K. Writing-review and editing: M.B. Visualization: A.F.K. All authors have read and agreed to the published version of the manuscript.

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